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American Steel:

Responding to Foreign Competition

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Introduction

On September 18, 1984, President Reagan announced that he was rejecting the recommendation of the International Trade Commission to institute a mandatory import quota of fifteen percent of the U.S. steel market. The Administration opted instead for negotiations with Brazil, Japan, Korea, and Spain for "voluntary export restraints" that would reduce steel imports to an 18.5 percent share. At the time, the President's compromise was hailed as both a victory for free trade and a victory for the steel industry. In the long run, it will likely prove to be neither.

Recent news reports estimate that voluntary restraints may reduce imports to about 22.5 percent, much closer to the current import level of 26 percent than originally hoped for. This would not please the steel industry and it could result in pressure for the 99th Congress to dust off some of the legislation (H.R. 5081 and S. 2380, the "Fair Trade in Steel Act") introduced in the previous session to limit imports to fifteen percent. The House bill had over 200 co-sponsors although it faced stiff opposition in the Senate. While a cry of "trade war" might be extreme, our already-strained relations with Japan and the European Economic Community are undergoing further stress as a result of such unilateral action.

What is most disturbing about the application of quotas (by whatever name they are called) to the steel industry's problems is that they will cost the American people \$5 billion annually while producing no net benefits to our economy. As this report demonstrates, Big Steel's gains will likely result in far greater losses for America's steel-using sectors. To properly address the steel industry's woes, we must deal with root causes.

This report first identifies the symptoms of malaise in American steel—it is these symptoms that are being treated by trade protection remedies. The underlying causes of the decline in this industry are then identified, followed by an analysis of the "problems with the solutions" being touted in Washington. The last section of the report suggests both private and public responses that are more appropriate remedies for the basic problems besetting the steel industry.

Symptoms of the Malaise in American Steel

The American steel industry has suffered severely since 1981, by any measure.* Employment has declined from 391,000 jobs in 1981 to 243,000 in 1983, a 38

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*Technically, the steel industry is made up of the carbon steel producers and the specialty steel firms. In terms of employment and tons of product, the specialty steel sector is small compared with the carbon steel sector. Unfortunately, production and employment statistics are rarely disaggregated.

percent drop in a period of just two years. The industry incurred losses totaling \$6.8 billion in 1982 and 1983. Long-term debt soared and debt/equity ratios more than doubled. Raw steel capacity has dropped over 19 million tons from 1981 to 1983.¹

To a large extent, these adverse trends are due to the same forces as those besetting the steel industries in all industrialized countries. But our problems are certainly more severe than in some other nations, particularly Japan. Why is this so? Are the sources of the industry's problems due to imports, managerial mistakes or other factors?

Longer-term View of the Steel Industry

Several facts are abundantly clear, and these were clear long before the current "crisis." First, the American steel industry has been sick for a long time—at least since 1959. In only one year during the past 25 has the industry earned a rate of return on equity equal to the average for all manufacturing.² Even during the ten-year period from 1969 to 1978, which includes the most profitable years for U.S. steelmakers since 1959, the industry's financial performance was poor.

It was not for lack of trying. The American steel industry invested over \$24 billion (in constant 1978 dollars) during that period, far more than the profits the companies earned. In contrast, only \$7.2 billion was paid out in dividends. Yet, in spite of the huge reinvestment, the industry's stock declined 50 percent (\$8 billion) in market value.³ This implies an annual return on equity of minus 8 percent. It is not hard to understand why the integrated steel industry is complaining about its inability to raise capital. Even during relatively good times their returns from capital investments have been very disappointing.

A second problem has been the very slow rate of productivity growth. Donald Barnett, former chief economist at the American Iron and Steel Institute, the industry trade association, has calculated that the U.S. integrated steel industry labor productivity increase averaged only 2-3 percent a year between 1958 and 1980.⁴ Only two completely new integrated steel mills have been built in the U.S. since World War II, and those plants, using the older open hearth technology, were considered to be obsolete by 1960.⁵

By comparison, 80 percent of the steel capacity in Japan and the newly industrialized countries was built since 1945, most of it using the newer basic oxygen furnace (BOF).⁶ While almost all U.S. integrated capacity has been retrofitted with BOF, we are still far behind in the application of continuous casting,

The reluctance of American managers and union leaders to admit to the lack of technological progress produced a steel industry that employs the highest cost steelworkers in the world but which is technologically behind the Japanese.

the other major technological change for integrated mills. The process bypasses several steps by working the metal while it is still hot from the steelmaking

furnace. This saves on energy costs and greatly reduces yield loss as raw steel is processed into finished products. This latter factor alone is responsible for a 10 percent Japanese advantage. The Japanese get .91 tons of sheet steel from each ton of raw steel, while U.S. mills produce only 0.83 tons.⁷ In 1981, the Japanese used continuous casting for 60 percent of their steel output while only 22 percent of U.S. steel was processed using this important technique.⁸

Unfortunately, the American steel industry took somewhat of a "head in the sand" view of its problems during the late 1970s. Some contemporaneous quotes from the trade press make that point clearly:

*"Taken as a whole, the domestic industry employs the most advanced steelmaking technology in the world."⁹

*"New technology has not been and is not likely to be the answer to the immediate profit problem."¹⁰

*"So there's no question that, overall, our steelmaking technology today is second to none."¹¹

*"There is no new steelmaking technology in sight."¹²

Luc Kiers, a steel industry consultant, comments:

Most major steelmaking technologies used today in the U.S. steel industry originated outside the United States. Unbelievable as it may sound, if history is proof, all current steelmaking processes in the world's steel production will at sometime in the future be displaced by newer methods.¹³

The reluctance of American managers and union leaders to admit to the lack of technological progress during the 1970s produced today's legacy—a steel industry, as shown in Table 1, that employs the highest cost steelworkers in the world but which is technologically behind the Japanese.

Identifying the Causes

Global Aspects of Steel's Decline

The world steel industry was booming in 1974. United States steel exports increased sharply and reached almost 6 percent of U.S. production. The euphoric mood in steel gave rise to forecasts of continued strong growth in demand through 1985; e.g., the industry press forecast increases in domestic U.S. steel demand of over 30 million tons by the 1980s.¹⁴ As recently as 1979, experts stated that the early 1980s would see shortages of capacity, as very little new supply would be added in the U.S. and Europe.

Today the steel industry has enormous worldwide excess capacity. In 1983, Western world steel usage stood at 408 million tons while capacity was 611 million tons, leaving an excess capacity of 33 percent.¹⁵ Many steel mills in the United States and Europe have been closed and Japan may soon follow suit. What caused this collapse? Why did the industry not foresee its future?

Reduced demand. First, the worldwide recession, induced in some measure by the second round of OPEC oil price increases in 1979, is responsible for much of the problem in world steel. Most steel is used in construction and in producing other durable investment goods, which decline very rapidly during

Table 1
A COMPARISON OF STEEL INDUSTRY AND AVERAGE
MANUFACTURING WAGES, SELECTED COUNTRIES, 1978

Country	Total hourly compensation for production workers		Compensation ratio of iron and steel to all manufacturing
	All manufacturing	Iron and steel	
United States	\$8.33	\$14.04	1.69
Europe			
Germany	9.48	10.60	1.12
Netherlands	9.77	12.01	1.23
Italy	6.18	6.98	1.13
Latin America			
Brazil	1.67	2.12	1.27
Venezuela	2.53	n/a	—
Mexico	2.00	n/a	—
Asia			
Japan	5.47	8.22	1.50
Korea	0.85	n/a	—
Taiwan	0.80	n/a	—
Hong Kong	1.13	n/a	—

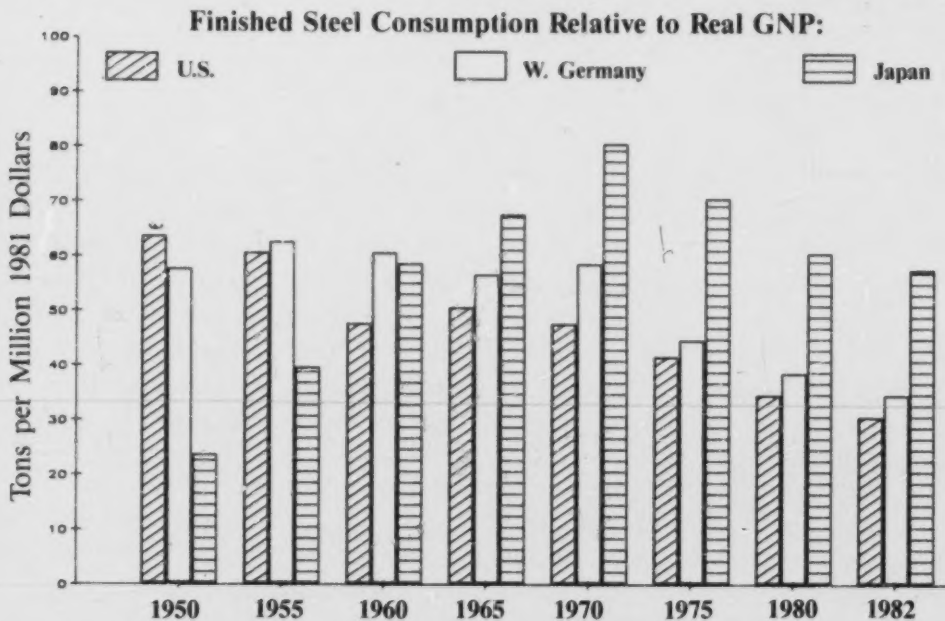
Source: Brookings Institution

recessions. The very sharp drop in steel production from 1981 to 1982 (over 45 million tons, or 47 percent) and the reduction in usage of almost 30 million tons (about 32 percent) suggests the cyclical nature of most of this decline.¹⁶ However, this cyclical fluctuation occurred in addition to several adverse long-term trends.

A second factor has been the declining steel-intensity of output in the developed world. Figure 1 illustrates the gradual decline in the steel-intensity of GNP as incomes go up. After some stage of development, it appears that the new products that consumers demand involve less and less steel.¹⁷ In 1974, the beginning of the OPEC era of high energy prices added a new element. The motor vehicle sector, in particular, has responded to high oil prices by making lighter automobiles using more aluminum and plastic, and less steel. Consumers also have responded to higher transportation costs by buying fewer new cars. The industrialized world has now arrived at an era of flat or very slowly growing steel consumption. Such a setting implies that overall growth can only occur through exports to the developing nations.

Figure 1

DECLINING INTENSITY OF STEEL USAGE IN WESTERN ECONOMIES



Source: Barnett and Schorsch, *Steel: Upheaval in a Basic Industry*

Note: Cross-country comparisons are not meaningful; changes over time should be viewed as the relevant index.

Worldwide competition. The third negative factor influencing the U.S. steel industry has been the success of producers in Japan and newly industrialized countries (NICs). Robert Crandall, a prominent economist and authority on the steel industry, has analyzed the reasons for Japan's performance. He found that in 1959, the Japanese faced a substantial disadvantage compared to the U.S. in raw material (ore and coal) costs as well as labor productivity.¹⁸ But its domestic market for steel was rapidly growing and wages were low enough to keep out U.S. imports. The Japanese arranged with the Australians and Brazilians to develop new, high-yield, iron ore deposits and built large ore handling facilities in deep-sea ports.

The Japanese also began to build larger bulk ore carriers. Typical ore carriers grew from 8,000 tons to over 75,000 tons. They also built new steel mills on their coasts to keep ore and handling trans-shipment costs at a minimum. By 1975, 82 percent of Japan's steel capacity lay in coastal areas with coterminous ore-handling facilities for unloading bulk carrier ships. In contrast, only 10 percent of U.S. capacity was similarly situated to take advantage of the now much cheaper and higher quality Australian and Brazilian ore.¹⁹

The importance of shipping costs is underscored by the fact that it costs only about one-third as much to ship a ton of steel from Yokohama to Los Angeles than to send it by rail from Chicago to Los Angeles.²⁰ The location of the American steel industry has been largely determined by the railroad network, the Great Lakes ore deposits, and the old, basing-point pricing system—all of which provided little incentive to locate in coastal areas. This may have been

a disadvantage for American mills in the past. However, as discussed later in this report, this apparent disadvantage in location could be a key element in reviving the industrial heartland of America.

As the Japanese industry grew after 1959, it was able to build newer, larger, technologically modern mills with capacity that exceeded the average U.S. mill.²¹ Nippon Steel's Oita works, for example, uses two blast furnaces to produce almost as much pig iron as the combined facilities of Republic Steel's fifteen furnaces.²² Using new laborsaving devices, the Japanese plants became the most efficient in steel yield, and in labor and energy usage. The Japanese have also invested in research and development to maintain that technological advantage. For instance, their commitment to R & D in 1982, expressed as a ratio of R & D spending to sales, was nearly two and one-half times the corresponding figure for the U.S. steel industry. In fact, the American steel industry's R & D spending per sales dollar is less than any other U.S. industry except food processing and textiles.²³

To summarize, Japanese raw material, labor, and shipping costs fell substantially while U.S. costs rose. Though Japanese steel wages rose 244 percent from 1958-1968, productivity increased more rapidly, thus reducing unit labor costs by 30 percent. During the same period, even though U.S. steel industry wages rose only 39 percent, this was enough to offset productivity growth. By the late 1970s, Japan became the world leader in steel technology and labor productivity. By 1980, it enjoyed a 10-20 percent advantage for most steel products (see Table 2 for details). Recent developments in the U.S. industry

Table 2
HISTORICAL COMPARISON OF U.S. AND JAPANESE
LABOR PRODUCTIVITY

(Man hours per net ton of product)

	1958		1964		1972		1980	
	U.S.	Japan	U.S.	Japan	U.S.	Japan	U.S.	Japan
Integrated								
Hot-rolled sheet	9	27	8	14	6	6	5	4
Plate	11	29	10	16	8	7	8	5
Cold-rolled sheet	12	36	10	19	8	8	7	6
Hot-rolled bar	13	32	12	17	10	7	8	5
Wire rod	12	28	11	14	8	6	6	4
Minimills								
Hot-rolled bar	14	38	10	19	6	8	4	4
Wire rod	14	35	9	17	6	7	4	3

Source: Barnett and Schorsch, *Steel: Upheaval in a Basic Industry*

and low operating rates in Japan have helped to equalize productivity, but the U.S. industry is still behind technologically.²⁴

Even Japan is under competitive pressures due to the entry of increasing numbers of NICs into the steel market. In 1977, 9 NICs were each producing over one million tons of steel.²⁵ There are many non-industrialized countries which now have a large steel market but little or no domestic industry, and it is likely that some of them will be developing this industry over the next decade.

Crandall has convincingly argued that it is now much easier for such countries to develop their own steel industry, buying complete "turnkey" mills from Japanese firms which build them, install the equipment, train the workers and technicians and then turn over the working plant to its owners. A NIC can buy these facilities at about the same cost as U.S. or European firms and only 10 percent over Japanese capital costs.²⁶ The raw material and other non-labor costs are close to the same worldwide if the mill is built in an ocean port. Labor productivity in many of these new NIC mills is only about 20 percent lower than in Japan.²⁷ The much lower wages paid in these countries (see Table 3) yield both lower unit labor costs and lower overall production costs than in any industrialized country, including the U.S. and Japan.

Table 3
PRODUCTION COSTS IN NEW STEEL MILLS
(1978 U.S. \$ Per Metric Ton)

	U.S. and EEC	Japan	Other Asia	Latin America
Labor	\$108	\$ 69	\$ 22	\$ 44
Raw materials	190	190	190	190
Capital costs	178	152	168	209
Total	\$476	\$411	\$380	\$ 443
Assumptions:				
Manhours/ton	7.7	7.7	11	11
Wage rate (\$/hr)	14	9	2	4
Cost of facilities/ finished ton (\$)	938	800	800	1000
Capital charge (percent per year)	17	17	19	19

Source: Brookings Institution

It seems likely that the only growth market for steel in the foreseeable future will be the developing world, which will become increasingly self-sufficient, as shown in Table 4. The NICs are currently the only places in the world where

Table 4
PROJECTED CHANGES IN FREE WORLD
STEEL CONSUMPTION AND CAPACITY
(millions of metric tons)

	1980	Estimated 1985	Estimated 1990
Consumption			
North America	132	130	127
EEC	108	100	96
Japan	79	73	73
Other Industrialized Countries	46	47	50
Developing Countries	98	112	137
Total Free World	463	462	483
Steelmaking Capacity			
North America	152	—	128-146
EEC	190	—	145-159
Japan	142	—	140
Other Industrialized Countries	51	—	50-53
Developing Countries	60	—	112
Total Free World	595	—	575-610

Source: *Iron Age*, December 5, 1983, p. MP-9; and OECD, *OECD Steel in 1981* (Paris: OECD, 1983), p. 33.

building new integrated steel capacity is profitable without trade protection or government subsidies. There is no obvious reason to expect that situation to change over the next 25 years.

Steel imports, largely from Japan and Western Europe, reached 15 percent of the American market in 1968. Import penetration fluctuated between 13-20 percent during the 1970s and is around 23-26 percent today. Just about a third of these imports are from the NICs (see Table 5). Among the factors contributing to the woes of U.S. steel makers is the recent rise in the value of

Table 5

STEEL MILL PRODUCT IMPORTS BY AREA OF ORIGIN

(in millions of metric net tons)

Year	Asia and Africa	% of Imports	Latin America	% of Imports	Japan	% of Imports	EEC	% of Imports ^d	Total Imports	% of U.S. Apparent Supply
1965	-a	0	0.2	1.4	4.6	43.0	5.1 ^b	47.7 ^b	10.7	10.6
1967	-a	0.3	0.3	2.5	4.7	43.9	5.9 ^b	49.6 ^b	11.9	12.7
1969	0.1	0.7	0.3	2.1	6.5	44.5	6.3 ^b	43.2 ^b	14.6	^a 14.2
1971	0.3	1.6	0.6	3.2	7.3	38.6	8.6 ^b	45.5 ^b	18.9	18.4
1973	0.8	5.0	0.5	3.1	6.1	38.4	6.7	42.1	15.9	13.0
1975	0.5	4.2	0.1	0.8	5.8	48.3	4.1	34.2	12.0	13.5
1977	1.4	7.3	0.4	2.1	7.8	40.4	6.8	35.2	19.3	17.8
1980	1.6	10.3	0.6	3.9	6.0	38.7	3.9 ^c	25.2 ^c	15.5	16.3
1981	1.8	9.0	0.8	4.0	6.2	31.2	6.5	32.7	19.9	18.9
1982	1.8	10.8	1.0	6.0	5.2	31.1	5.6	33.5	16.7	21.8
1983	2.5	14.6	2.4	14.0	4.2	24.6	4.1	24.0	17.1	20.7 ⁵

Source: American Iron and Steel Institute

Notes: ^aLess than 50,000 tons.^bIncludes U.K., though not yet in EEC.^cIncludes Greece though not yet in EEC.^dTotals include other countries not detailed above.

the U.S. dollar on currency exchange markets (see Table 6). The value of the dollar has increased 45 percent compared to the trade weighted average for 67 countries since 1980.

Table 6
EXCHANGE RATE INDICES-
VALUE OF U.S. DOLLAR
(1980 = 100)

	67 Country Average ^a	14 Industrial Country Average ^a	West Germany	Japan
1970	96.2	122.6	200.6	158.0
1975	89.7	106.5	135.4	130.9
1976	94.6	109.5	138.6	130.9
1977	98.0	109.2	127.8	118.5
1978	95.6	101.0	110.6	92.9
1979	97.3	100.0	100.8	96.7
1980	100.0	100.0	100.0	100.0
1981	110.0	108.6	124.4	97.3
1982	127.5	119.0	133.6	109.9
1983	145.0	122.3	140.6	104.9

Source: Department of Commerce

Note: ^aTrade weighted average.

It is interesting to note, however, that the U.S. dollar/yen exchange rate has changed very little from 1980 to 1983; the dollar has appreciated only 5 percent during that time. Japanese imports, however, decreased from 6.5 million metric tons to 4.6 million and Japan's import share from 39 percent to 25 percent.

The dollar has appreciated 22 percent from 1980 to 1983 relative to a trade weighted average for fourteen industrialized countries. Meanwhile, European Economic Community exports to the U.S. have remained nearly constant, about 4 million metric tons. The lofty value of the dollar is nearly identical with its relative value to this bundle of currencies in 1970-71, when EEC imports were nearly twice their current level.

Since 1980, more relevant factors other than the exchange rate have played a dominant role in the ability of U.S. steel to compete for the U.S. market. A weaker dollar will not erase the cost advantages enjoyed by Japan and the NICs.

Problems with a "Made in USA" Label

It does appear that many of the domestic steel industry's problems are of its own making, with labor and management both sharing in the blame. In the late 1950s, our steel labor was three times as productive as Japan's; by 1980, they were equally productive; now the Japanese are ahead.

The problem of work rules and wages has been fundamental in the American integrated carbon steel industry. In 1970, U.S. steelworkers were moderately well-paid, receiving wages about one-fourth higher than the average U.S. manufacturing worker—a wage differential similar to that in Japan. By 1982, members of the United Steel Workers (USW) were receiving a premium of 64 percent above average U.S. manufacturing wages.²⁸

This huge increase in wages had three major effects. First, since wages far exceeded productivity gains, unit labor costs grew rapidly—1.8 percent annually since 1971 (while unit labor costs fell in Japan). Second, the large amount of cash flowing to labor reduced profitability and made it more difficult to finance capital improvements. Over the period 1970 to 1982, the escalating wage differential amounted to \$26 billion (in 1982 dollars), a sum very close to total investment in plant and equipment in the steel industry during the period.²⁹ Finally, the higher wages created expectations on the part of steelworkers which the steel firms and the American economy simply could not afford to meet.

The higher wages make U.S. firms unable to compete with foreign firms without some technological advantage. Ultimately, this large run up in wages causes more unemployment in the steel industry. The United Steel Workers

In 1970, steelworkers received wages about one-fourth higher than the average U.S. manufacturing worker but by 1982 that wage premium was nearly two-thirds. This increase in wage differential alone amounted to \$26 billion.

admitted the obvious negative relation between wages and jobs when it accepted wage freezes and reductions during the recent recession. As things stand, only actions which cause major increases in productivity (such as technological or work rule changes) will enable the U.S. integrated steel producers to compete more effectively with foreign integrated mills.

Domestic Competition from the Minimills

Even without import competition, the larger integrated mills are losing out to domestic competitors—namely U.S. "minimills." These electric furnace mills largely use scrap instead of ore and are located in the urban areas they serve. The minimills had only 3 percent of the U.S. market in 1960, but 20 percent today.³⁰ They have remained profitable throughout the period, even during the recent recession when the integrated firms lost over \$6.7 billion. These minimills can produce a ton of finished steel product with \$60 of labor compared to \$131 for an integrated mill.³¹ Moreover, their capital costs are approximately one-half those of the large mills.³²

Minimills can compete head-to-head with foreign steel. For example, since Nucor Steel's Utah plant opened in 1981, it has recaptured 35 percent of the domestic market for its products from Japanese and South Korean competitors,¹¹ leaving these Asian producers with only 15 percent of the West Coast market.

Employment and Output Prospects for American Steel

The future of the American steel industry cannot be forecast with certainty but a reasonable estimate of output and employment can be quantified. Table 7 summarizes projections for output and employment based on assumptions used in several recent analyses. Assuming no growth in domestic demand or imports, the minimill share of domestic shipments will grow as the result of

Table 7
FORECAST OF FUTURE COMPOSITION AND EMPLOYMENT^a
IN THE U.S. STEEL INDUSTRY

	1984	1990	2000	Units
Usage	105	105	105	Millions of Metric tons
Imports	23	23	23	M tons
Domestic Shipments	82	82	82	M tons
Integrated	66	61	54	M tons
Minimill	16	21	28	M tons
Minimill Share ^a	20	26	34	Percentage
Minimill Annual Growth		4.5	2.9	Percentage
Productivity				
Integrated ^b	250	300	404	Tons/employee
Minimill ^b	500	761	1532	Tons/employee
Employees				
Integrated	264	203	134	thousands
Minimill	32	28	18	thousands
Total	296	231	152	thousands

Source: Center for the Study of American Business

Notes: ^aBased on Barnett and Schorsch, p. 280.

^bAt 3 percent improvement annually for integrated, 7 percent for minimill.

the gradual move into new products and further reduction of import shares in those minimill products. In contrast, even without increased import penetration, integrated carbon steel production is likely to decline by 12 million tons by the year 2000, 18 percent below current levels.

The productivity assumptions used in this estimate reflect a continuation of rapid change in the minimill sector (7 percent a year) and an increase in productivity by the integrated sector (3 percent a year), somewhat better than the 2-3 percent during the 1958 to 1980 period. The overall result is an estimated decline in domestic steel employment of almost 50 percent (from 296,000 to 152,000) by the year 2000. Since the median age of American steel employees is 42, a substantial portion of this reduction can occur through attrition.

What other factors might change this forecast? First, the growth rate of the minimill sector may be underestimated. It has expanded at an annual rate of 10 percent the past 25 years.¹⁴ The Barnett-Schorsch estimates imply a substantial reduction in this growth rate. If the assumed productivity trend continues, this could result in a higher growth rate, closer to the recent trend. It is likely that this would occur at the expense of imports, with some growth in steel usage also occurring.

One other possible problem in the forecast is the assumed productivity in the integrated sector. This sector has not achieved this rate of productivity growth in any of its basic products since 1964. If integrated firms cannot improve this rapidly, then imports and minimills will take larger market shares and employment will likely be even lower.

Summary of Causes

Steel is truly a global industry today. Higher productivity, lower wages, and lower raw material costs make a number of newly industrialized nations, along with Japan, highly efficient competitors. While competition is increasing, global steel demand is sluggish at best and may even be declining in the industrialized nations. The high value of the U.S. dollar is a contributor to

A weaker dollar will not erase the cost advantages enjoyed by Japan and the Newly Industrialized Countries.

domestic steel's recent difficulties but the problems facing American integrated steelmakers will not be completely erased by a weaker dollar. Cries for the government to "do something" generally ignore the contribution of federal fiscal policy—triple digit deficits—to trade problems. Most of the solutions to "Big Steel's" problems, however, require adjustments by the industry itself.

Problems with the Solutions

As mentioned at the outset of this report, the industry desired the federal government to help by instituting a quota of 15 percent on steel imports. Instead the President decided to have U.S. Trade Representative William Brock negotiate voluntary export restraints (VERs), with the newly industrialized

countries limiting steel imports to 18.5 percent of the domestic market. This is an approach similar to the "voluntary" restraints obtained from Japan for the U.S. auto industry. The threat of more draconian measures being applied by the Congress enhances the executive branch's ability to negotiate with the "offending" export nations.

There is some doubt that Mr. Brock's negotiations will be able to cap steel imports at the desired 18.5 percent level. The more important issue, however, is whether VERs will do more good than harm for the U.S. economy. The following analysis indicates that the economic costs of export restraints far exceed the benefits. In the long run, even the industry, its owners and its employees will suffer from applying the wrong solution to Big Steel's problems.

Effects of Earlier Trade Protection

This is not the first time that the American steel industry has applied for protection from imports. In 1959, during a long steel strike, the U.S. first became a net importer of steel. By 1968, imports reached 18 percent of domestic consumption. To forestall congressional action, the Japanese and EEC industries agreed to a three-year Voluntary Export Restraint (VER) limiting imports to 4.75 million tons each in 1969, with an allowed 5 percent growth a year thereafter. With this quantity restriction in place, enforced by the foreign governments, imports fell in 1969.

The Japanese and EEC firms reacted by raising prices and exporting higher value products. The immediate result in 1969 was that imported tonnage fell 23 percent but its value declined by only 11 percent.¹⁵ In particular, imports of higher-priced, specialty steel rose 57 percent (measured in tonnage) over the next two years. Furthermore, non-quota countries—such as the United Kingdom, Korea, Brazil and Spain—began to develop their steel industries to supply the lower grades of the U.S. steel market.

The unsatisfactory results of the first VER brought about a much more detailed agreement in 1972, adding the U.K., and explicitly limiting specialty steels imports.¹⁶ By 1974, that agreement became less important as world steel prices rose well above U.S. prices.

The worldwide steel shortage in the mid-1970s created a short-lived euphoria, but it led American steel firms to offer the Experimental Negotiating Agreement (ENA) during collective bargaining in 1974. The ENA guaranteed a three percent wage growth on top of a cost of living adjustment of two-thirds to three-fourths of the Consumer Price Index in exchange for a no-strike commitment. This, then, became the base for the next round of negotiations in 1977.¹⁷ The inflation of the 1970s and the ENA together caused the massive runup in steel wages discussed previously.

The Carter Administration tries trigger pricing. The 1975 world recession led to a steel crisis. By early 1977, imports again reached an 18 percent share of the U.S. market. The industry initiated several antidumping suits against a number of the major exporting nations. The Carter Administration responded with the Trigger Price Mechanism (TPM). The TPM defines a "trigger price" or price floor for imported steel. Sales at prices below this level would be

considered dumping. The trigger price was to be based on the costs of the lowest cost producer (Japan) plus an 8 percent profit on sales. The domestic industry hoped that this would limit imports to a 15 percent share as well as provide a price floor for its products. This system lasted, with a brief interruption, until the early part of the Reagan Administration.

The results from all of these efforts to protect the American steel industry were predictably disappointing. The industry raised its prices; steel prices rose 33 percent faster than all industrial products during 1970-1977. The union succeeded in raising wages, and the U.S. ended the decade behind the Japanese technologically.³⁸ Kiers has said of the TPM that it was "no way to attain efficiency or to increase productivity. . . [It] mitigated the effect without curing the cause"—an epithet which applies in general to protectionism.³⁹

The Consumer Pays a Hidden Tax for Quotas

How would the current proposal for quotas on steel imports affect American consumers? A recent analysis by the Congressional Budget Office (CBO) projects the effects of a 15 percent import ceiling on the U.S. steel industry and the public. The CBO's analysis shows steel prices rising by 8.9 percent above what they would otherwise be in 1985.⁴⁰ This higher price would reduce domestic steel demand by 4.1 percent; however, the reduced import share results in a net increase in domestic shipments of 5.7 percent. Domestic steel employment would rise by 5.8 percent or 23,000 jobs. The increased profits and jobs are the advertised benefits, but what are the costs?

The CBO report estimates the costs of the program to the consumer as averaging \$4.3 billion a year (in 1983 dollars); \$1.7 billion of this amount would actually flow to *foreign* producers⁴¹ (see Table 8). Foreign producers benefit

Table 8
ESTIMATED COST TO CONSUMERS OF A
15 PERCENT QUOTA ON STEEL IMPORTS
(billions of 1983 dollars)

Year	Income Transferred to Domestic Producers	Income Transferred to Foreign Producers	Total Cost To Consumers
1985	1.5	2.1	3.6
1986	2.3	1.8	4.1
1987	2.5	1.5	4.0
1988	3.0	1.6	4.6
1989	3.4	1.7	5.1
Average	2.5	1.7	4.3

Source: Congressional Budget Office

because the import quotas would give them free, though limited access to, what would become higher prices in the protected U.S. steel market. The benefits to foreign steel producers would be generated in the same way as they are for Japanese automakers. A VER on autos was negotiated to begin in April, 1981, and extended through March, 1985. Recently, Mori Matsumoto, a Japanese securities firm vice-president, reported that Japanese auto firms had record profits on almost static sales. Most interesting was his statement that 80 percent of their profits was due to exports to the U.S., even though this represented less than 20 percent of sales by units.⁴²

Steel quotas would cost consumers about \$189,000 (in the form of higher prices) for each job saved, making this one of the most expensive job creation programs ever conceived by the U.S. Congress.

Over the 1985-1989 period as a whole, the CBO estimates that 26,000 steelworker jobs would be protected, costing consumers about \$189,000 (in the form of higher prices) for each job saved. This makes quotas one of the most expensive job creation programs ever conceived by the U.S. Congress.

Steel's Gains are the Steel-Users' Losses

Other costs of steel import quotas to the U.S. economy have received little attention thus far. U.S. industries that use steel would suffer employment losses greater than steel's gains! Higher steel prices in the U.S. would tilt the global "playing field" against these domestic industries. Both the CBO and Trade Representative Brock have alluded to this effect but have not been able to satisfactorily document it.

While it is difficult to provide a precise figure for employment effects in the steel-using sectors it is possible to calculate an approximate estimate.⁴³ In this calculation the responsiveness of demand in each manufacturing sector to an increase in the price of steel is estimated in a manner consistent with the overall decline in demand projected by CBO. If production cutbacks are assumed to take place in the most efficient firms—those with labor productivity of 25 percent above the average—a conservative estimate of employment effects can be obtained. For example, a 10 percent drop in output of transportation equipment (SIC 37) would translate to only a 7.5 percent reduction in employment in this sector. Assuming that all manufacturing industries face demand curves that have the same price elasticity, a 15 percent import quota, inducing an 8.9 percent increase in price, would result in a loss of 93,000 jobs in steel-using sectors. Thus, even taking into account the 26,000 steelworker jobs that would be "saved," the imposition of an import quota would result in a net loss of 67,000 jobs in the American workforce (see Table 9). Most of the job losses would be concentrated in metal fabrication, nonelectrical and electrical machinery, and transportation equipment (SIC 34-37), which are the major steel-using sectors in manufacturing.

These estimates are imprecise but, nonetheless, they make it clear that the job loss in steel-using sectors would exceed by a wide margin the number of

jobs protected in the steel industry itself. The end result of the proposed steel import quota would be an estimated net job loss plus a cost to consumers of almost \$5 billion a year! To add insult to injury, one-third of the dollars taken out of the pockets of consumers and employees in steel-using industries would go to foreign steel firms.

Summary

The popularity of import quotas as a policy remedy for the steel industry's problems does not imply that they will produce economic benefits that will outweigh costs. Quotas have a great deal of political charm whether or not

A 15 percent import quota would induce an 8.9 percent increase in the price of steel and a loss of 93,000 jobs in steel-importing sectors. Thus, even taking into account the 26,000 steelworker jobs that would be saved, a quota would result in a net loss of 67,000 jobs in the American workforce.

they make good economic sense. Import restraints do demonstrate to steel industry employees and others with a major economic stake in steel that the federal government is "doing something" for them. The costs, meanwhile, are more widely dispersed among consumers and employees in steel-using sectors. Ultimately—but almost invisibly—import restraints do not even benefit the steel industry itself as they temporarily insulate it from the rigors of international competition that would otherwise force labor and management to adopt practices that would reduce costs, increase productivity, and otherwise enhance the industry's ability to meet foreign competition.

Addressing Steel Industry Realities

What can or should be done for the American steel industry? Are there policy options that government should exercise to enhance its ability to compete or to facilitate adjustment to the surplus in worldwide steel making capacity? These questions face every industrialized nation, including Japan.

"Do It Yourself" Fixes Needed in Integrated Steel

The future for steel production in the United States appears to be in two areas: 1) our inland integrated steel mills centered in Chicago and the Great Lakes, which now represent over half of our integrated steel capacity;⁴⁴ and 2) minimills, whose expanding product range and cost effectiveness will provide rapid growth for at least another fifteen years. The Chicago-based mills have considerable geographic advantages. Rail transport and Great Lakes shipping costs raise the delivered cost of foreign steel sufficiently that this part of integrated steel should be able to service close-at-hand steel-using industries in a competitive fashion. While the high dollar exchange rate has enabled some foreign steel to be price-competitive in the north central U.S., it would take only a small drop in the value of the dollar to price most foreign steel out of this market as well.

Table 9
LOSS OF JOBS IN STEEL-USING INDUSTRIES
DUE TO A 15 PERCENT STEEL IMPORT QUOTA

Sector (S.I.C. number)	Steel Coefficient (1979)	Employment in thousands (1984)	Sales in \$ billions (1984)	Employment Effect of a 15% Quota in thousands
Food and kindred products (20)	0.02156	1622	156.4	- 2.1
Tobacco products (21)	0.00565	68	112.1	—
Textile mill products (22)	0.01123	743	140.8	- 0.5
Apparel products (23)	0.01472	1164	—	- 1.0
Paper products (26)	0.019789	661	164.3	- 0.8
Printing and publishing (27)	0.00978	1295	152.5	- 0.7
Chemical products (28)	0.02108	1046	215	- 1.3
Petroleum and coal products (29)	0.01139	195	120.3	- 0.1
Rubber and plastic products (30)	0.0282	718	219.9	- 1.2
Leather products (31)	0.01733	207	61.9	- 0.2
Lumber products (24)	0.03385	657	137.2	- 1.3
Furniture and fixtures (25)	0.12325	446	170.5	- 3.2
Clay, glass and stone products (32)	0.0228	572	143.4	- 0.8
Fabricated metal products (34)	0.330071	1373	120.2	- 26.7
Nonelectrical machinery (35)	0.14103	2038	150.6	- 16.9
Electrical machinery (36)	0.12137	2023	185.5	- 14.5
Transportation equipment (37)	0.18442	1756	117.8	- 19.5
Instruments (38)	0.05508	694	158.7	- 2.3
Total		17278	2527.1	- 93.1

Source: Department of Commerce

The National Defense "Red Herring"

Some supporters of protection for the steel industry have raised the spectre of fortress America, cut off from its foreign sources of steel, unable to fight a conventional war. The likelihood of such an event is beyond the scope of economic analysis. However, a brief review of steel needs in recent conventional wars will help provide some perspective.

The most recent conventional war, the Vietnam conflict, used a maximum of 2.2 percent of our domestic steel production.⁴⁵ During World War II, some 40 percent of total steel shipments were used in direct military uses plus construction. This amounted to a peak of 25 million tons in 1943. Today, automotive and other consumer uses of steel constitute around 20 million tons. In addition, construction demand requires another 10 million tons.⁴⁶ This represents 44 percent of domestic shipments to direct users. If automobile, appliance and some construction steel shipments were redirected to defense uses, as in World War II, our current steel industry would have little difficulty in supporting an effort of World War II proportions, the largest in our history.

It might be difficult to produce ships in the volume attained between 1940 to 1945. However, the low current level of U.S. shipbuilding is of greater concern than the availability of steel plate production. Cargo aircraft using very different materials would likely replace some of the transport functions previously carried out by ships. Finally, a conventional conflict with any nation other than Soviet Union should not hamper U.S. access to the ship-building countries of Japan and Korea.

Even if one believes that the United States would be unable to produce some types of steel products believed to be essential in an emergency, the best solution would not be trade protection. An open, honest, and carefully targeted production subsidy would be a less costly solution.

Many of the changes needed to make the American integrated steel industry more competitive are rather mundane. Steel producers need to emphasize quality while chipping away at costs and making productivity improvements. As Crandall, and Barnett and Schorsch have shown, investment in new capacity, and even rounding-out existing mills, will be much less productive than focusing on incremental process changes that cut costs. Improvements in labor-management relations are essential for the industry to take advantage of process improvements that production workers usually see best. Structuring incentives to induce workers to come forward with these "learning-by-doing" improvements is essential—workers who fear that higher productivity will cost them their jobs will not do their utmost to increase productivity. This is an area where we would do well to copy the Japanese. Steel firms in Japan have enjoyed success in harnessing the knowledge of production workers to help cut costs and improve working conditions and job safety.

Improvements in labor-management relations are essential for the industry to take advantage of process improvements that production workers usually see best.

The newly-formed, employee-owned Weirton Steel Company furnishes an example of the potential for such worker-management relations. To consummate the Employee Stock Ownership Plan buy-out from National Steel, the non-USW union agreed to a 20-30 percent reduction in hourly compensation. In addition to these wage concessions there have been efforts made to improve the previously adversarial approach to worker-management relations. The goal of mobilizing the workers to promote process improvements and lower costs has already met with some success—one "employee participation group" (akin to a Japanese quality circle) made suggestions that halved monthly maintenance costs on their blast furnace. The firm is currently earning a \$41/ton operating profit versus breakeven results for most other integrated mills.⁴⁷ The wage cuts and favorable terms on their long-term debt have helped produce this profit so far, but longer run success will depend critically on continuing the worker-proposed process improvements.

The integrated producers will need to continue their focus on products for which they have a comparative advantage—particularly sheet steel, plates, large structural shapes, and large diameter tubes. Geographic trends are likely to continue in steel making production. Even in 1978, over half of the total U.S. steel production was already located around Chicago (the Great Lakes) and only 20 percent was in Pennsylvania.⁴⁸ With the recent plant closings in Pennsylvania, Indiana and Ohio are now the largest steel-making states with Illinois and Michigan closing in on Pennsylvania.

The best thing that Washington policymakers can do to facilitate the retrenchment and process changes needed in the steel industry is to continue some form of the investment tax credit that improves the return on investment in new equipment. State governments should avoid plant closing bills that

attempt to repeal market realities by legislative fiat. These "capture" bills would make it unattractive for new industry to locate in these states thus making reemployment less likely. *In addition, antitrust policy needs to recognize global markets.* The furor raised over the Republic/LTV merger was overblown considering the international competitive situation.

Healthy Minimills

Furthermore, we must realize that not all steel producers are in decline. U.S. minimills appear to be able to outcompete domestic and foreign integrated mills for some types of steel products. This has happened already in wire rods, small structural shapes and concrete reinforcing bars. Minimills are now beginning to make inroads in large structural shapes, hot rolled bars, and seamless tubes. The U.S. comparative advantage in scrap availability has made it the largest minimill market in the world. Many of the early mills in the U.S., as well as some of the most recently built, are Canadian-owned. This technology export from Canada to the United States represents a typical international market reaction that utilizes the comparative advantage of each nation. When U.S. Steel tried to go against this trend by making a large investment in a wire rod mill at its integrated South Chicago Works during the early 1970s, it could not compete in spite of the most advanced technology.⁴⁹

Global Steel Market

It is essential to grasp the fundamental change in international comparative advantage which is now taking place. Reduced shipping costs have brought all nations closer together, especially their coastal areas. This helped Japan during the 1960s and 1970s to become a world leader in steel. From the late 1970s on, however, a new force has become important. The development of turnkey steel plants has enabled many newly industrialized countries to acquire the most modern steel technology and to produce steel more cheaply than Japan.

The problems of Japan, with its coastal industrial regions, are great in its attempt to compete with NICs. Building integrated steel capacity in Japan is no longer profitable. In fact, it appears to be profitable only in the low-wage economies of the industrializing world. The NICs are now substituting domestic production of steel for imports from the industrialized economies and are also exporting to both less-developed and developed countries. In basic integrated steel mill products, these newly industrialized nations are the low cost producers. Japan cannot compete, nor can Europe or the U.S. without massive subsidies. Europe's long experience with steel and coal subsidies suggest that infusion of government funds is no remedy.

Quotas are not an appropriate response to these subsidies, however. The Administration has the authority to use compensatory tariffs to address this issue. Though tariffs will raise prices to the American consumer they also act as incentives for competitors to seek cost-saving measures to restore a price advantage. Quotas, on the other hand, reduce incentives to innovate since profits are not being squeezed by lower prices.

Moreover, the extent of foreign subsidies and dumping below cost is greatly exaggerated by steel industry spokespersons in order to justify quotas. For instance, there have been publicly made claims that foreign steel firms, such as Korea and Brazil, receive huge subsidies, amounting to 50 percent of costs. The facts, however, differ substantially from these claims. The Korean subsidy has been settled by the ITC which rejected the industry's exaggerated claims and determined the presence of a 2.2 percent government subsidy.⁵⁰

A similar result occurred in the often-cited *Gilmore* case in 1977. Here a Japanese exporter of steel plates was accused of dumping steel at 32 percent below cost. All antidumping duty was levied. American users of this steel began complaining that domestic suppliers were unable to produce the same quality product. In the final analysis, ITC determined that the extent of dumping amounted to only 7.9 percent below cost.⁵¹ The reality and the rhetoric about subsidies and dumping are often at wide variance.

The greatest subsidy to foreign steel producers comes from the rapid run up in the value of the dollar during the past four years. Some economists discount a linkage between federal government deficits, interest rates, and exchange rates. However, many others, including the last two Chairmen of the Council of Economic Advisers, Murray L. Weidenbaum and Martin S. Feldstein, have pointed the finger at \$200 billion a year deficits as an important contributor to the trade deficit problem. *It would seem that of all the possible policy responses available to Washington, reducing the deficit is one that they should best be able to address. There is a way—comprehensive budget cutting—but is there a will?*

To the extent that trade negotiations would be helpful in sorting out unfair trade practices—subsidies and quotas—they should be multilateral. Perhaps the current worldwide economic recovery would be an opportune time to attempt a new round of GATT (General Agreement on Tariffs and Trade) talks. Absent this multilateral approach, we are in danger of returning to a “beggar-thy-neighbor” approach to trade relations reminiscent of the Great Depression.

Japan's response, along with that of Canada's minimill technology, has been the most creative. Japan has chosen a new area of comparative advantage, where its skilled people can still outcompete the NICs. It is in large and technically complex construction work and modern machinery that the developed world possesses important and continuing advantages. Building turnkey plants in the less developed world will continue to be a profitable and growing market for some time to come.

Meanwhile, in the United States, the bright future for minimills will not do much to offset the decline in steel industry employment. There is little comfort in knowing that all the industrialized countries face this same problem. In fact, it is realistic to expect that productivity enhancements needed to effectively compete may, themselves, lead to some further declines in employment. A high-wage economy's comparative advantage is not in mature industries which must compete with low wage nations. Rather, it lies in new and growing areas, where highly skilled people are needed to keep pace with rapid technological change.

If Congress believes that the federal taxpayers should ease adjustments for individual steel industry employees, it behooves the lawmakers to institute programs for retraining and relocation assistance, with as many market incentives as possible. Quite simply, the more market-oriented these approaches, the more likely they are to succeed. Robert Reich has proposed the substitution of retraining assistance for long-term unemployment payments.

*Rather than preserve an industrial museum, we should
allow the retrenchment of the integrated steel sector
into the products and locations in which it can compete effectively.*

Perhaps a voucher system providing tax credits to an employer who aids in this transition would enhance the chances of meaningful reemployment.

The most dangerous public policy course is the one that this country appears to be embarking upon—reliance on import restraints. Protecting the steel industry at the expense of American steel-using industries is counterproductive. The net loss in jobs from this strategy could exceed 67,000 jobs. Rather than preserve an industrial museum, we should allow the retrenchment of the integrated steel sector into the products and locations in which it can effectively compete. The absolute size of that competitive domestic steel sector will depend, in good measure, on actions taken by the management and labor of the steel producers.

Notes

1. American Iron and Steel Institute, *Annual Statistical Report* (Washington, D.C.: AISI, various years).
2. Robert W. Crandall, "The Roots of the Current 'Crisis' in the U.S. Steel Industry: An International Perspective," in Harold R. Williams, (ed.) *Free Trade, Fair Trade, and Protection: The Case of Steel* (Kent, OH: Kent State University Press, 1978), pp. 46-67.
3. Robert W. Crandall, *The U.S. Steel Industry in Recurrent Crisis: Policy Options in a Competitive World* (Washington, D.C.: Brookings Institution, 1981), p. 86.
4. Donald F. Barnett and Louis Schorsch, *Steel: Upheaval in a Basic Industry* (Cambridge, MA: Ballinger, 1983), p. 119.
5. Luc Kiers, *The American Steel Industry: Problems, Challenges, Perspectives* (Boulder, CO: Westview Press, 1980), p. 154.
6. *Ibid.*, pp. 27, 72.
7. Barnett and Schorsch, p. 157.
8. *Ibid.*, p. 126. By 1983, American steel's use of continuous casting reached 32 percent; American Iron and Steel Institute, *Steel and America: An Annual Report* (Washington, D.C.: AISI, May 1984), p. 22. The Japanese reached this level by 1975, 8 years earlier.
9. *Report to the President, "The Steel Industry Today,"* (Washington, D.C.: American Iron and Steel Institute, May 1971), cited in Kiers, p. 67.

10. John R. Stubbles, "Steelmaking in the Seventies," *Iron and Steel Engineer Yearbook* (1974) cited in Kiers, p. 67.
11. Edgar B. Speer, *33 Metal Producing* (November 1976), p. 30, cited in Kiers, p. 67.
12. *Special Analysis: Steel, An Industry in Flux* (New York: Argus Research Corp., 31 August 1977), cited in Kiers, p. 67.
13. Kiers, p. 68.
14. *Ibid.*, p. 25.
15. Telephone interview with American Iron and Steel Institute, reporting figures from International Iron and Steel Institute.
16. AISI, *Annual Statistical Report*, various issues.
17. This view of steel demand is consistent with the "global model" used in the Projection 85 explained in International Iron and Steel Institute, *Steel Demand Forecasting* (Brussels: Committee on Economic Studies, IISI, 1983), p. 2-1, and Figure 1-3. Using this model, the estimate of the rate of economic growth needed to keep steel demand from falling is 3.2-3.5 percent per year. It is unlikely we will average more than this rate over the next decade.
18. Robert W. Crandall, "The Economics of the Current Steel Crisis in OECD Member Countries," in Organization for Economic Cooperation and Development, *Steel in the 80s* (Paris: OECD, 1980), pp. 140-148.
19. Hans Georg Mueller and Kiyoshi Kawahito, *Steel Industry Economies: A Comparative Analysis of Structure, Conduct and Performance*, (Japan: Steel Information Center, 1978), p. 8.
20. *Ibid.*
21. *Ibid.*, p. 6.
22. Kiers, p. 79.
23. Barnett and Schorsch, p. 60.
24. American Iron and Steel Institute, *Statement of the American Iron and Steel Institute, July 1984 Report of Congressional Budget Office* (Washington, D.C.: AISI, August 1984), p. 10.
25. American Iron and Steel Institute, *Annual Statistical Report*, various issues.
26. Crandall, *U.S. Steel Industry*, p. 79-80 and Table 4-4.
27. *Ibid.*, pp. 89-91.
28. AISI, *Annual Statistical Report*, various issues.
29. Calculated by author from published AISI data.
30. Congressional Budget Office, *The Effect of Import Quotas on the Steel Industry* (Washington, D.C.: CBO, July 1984), p. 6.
31. Barnett and Schorsch, Table 4-3, p. 95.
32. *Ibid.*, Table 7-4, p. 176.
33. Leslie Wayne, "The Going Gets Tough at the Nucor Minimill," *The New York Times*, August 7, 1983, p. 4F, cited in James F. Bennett and Thomas J. DiLorenzo, "Union, Politics, and Protectionism," *Journal of Labor Research* V(3) (Summer, 1984), pp. 299-300.
34. Barnett and Schorsch, p. 88.
35. Kiyoshi Kawahito, *The Japanese Steel Industry* (New York: Praeger, 1972), p. 149, p. 72, and William J. Hogan, *The 1970s: Critical Years for Steel* (Lexington, MA: D.C. Heath, 1972), pp. 59, 61.
36. Hogan, p. 64.

37. Crandall, *U.S. Steel Industry*, p. 35.
38. Kiers, p. 57.
39. *Ibid.*, p. 65.
40. CBO, pp. 41-44, Table 16.
41. *Ibid.*, p. 45, Table 17.
42. Crain Communications, Inc., "Japan's Automakers In the Money," *St. Louis Post-Dispatch*, Nov. 11, 1984, p. 11.
43. See Arthur T. Denzau, "Facing Up to the Problems Besetting 'Big Steel' " (St. Louis: Center for the Study of American Business, Working Paper No. 90, 1984), Appendix A, pp. 35-40.
44. Crandall, *U.S. Steel Industry*, p. 145.
45. *Ibid.*, pp. 99-100.
46. AISI, *Annual Statistical Report*, various issues.
47. "Making Money—and History—At Weirton," *Business Week*, November 12, 1984, p. 136.
48. Crandall, p. 145.
49. Barnett and Schorsch, p. 94.
50. United States International Trade Commission, *Cold-Rolled Carbon Steel, Structural Shapes from the Republic of Korea: An Investigation into 701-TA, 218 and 219, Preliminary*, Report 1559 (Washington, D.C.: USITC, Aug. 1984), citing Department of Commerce determination.
51. United States International Trade Commission, *Carbon Steel Plate from Japan* (Washington, D.C.: USITC, April 1978), p. 43, for Treasury initial 32 percent dumping finding, and p. 4, for final 7.9 percent determination.

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